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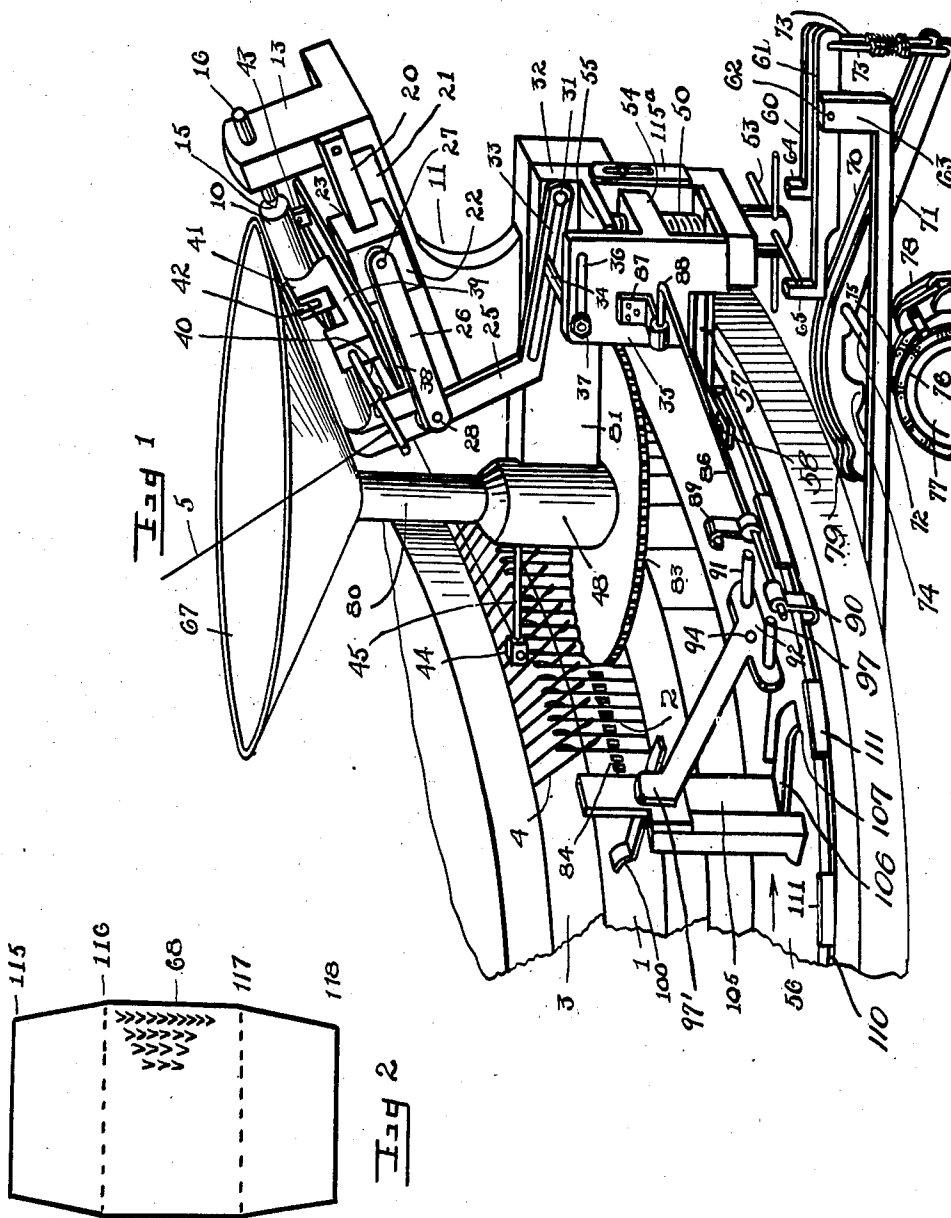
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2,029,227

GARMENT TAPERING ATTACHMENT FOR KNITTING MACHINES

Filed April 4, 1934

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

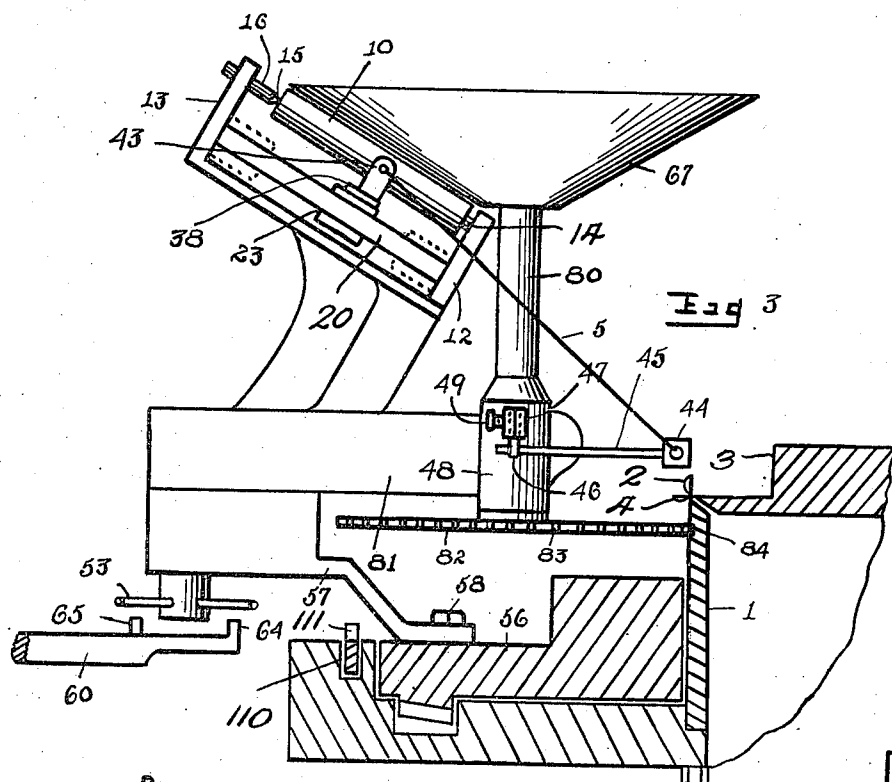


Fig. 3

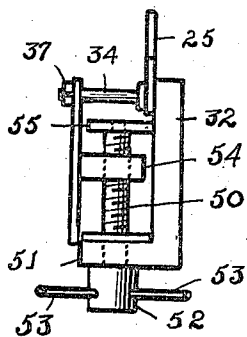


Fig. 4

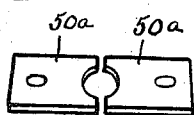


Fig. 7

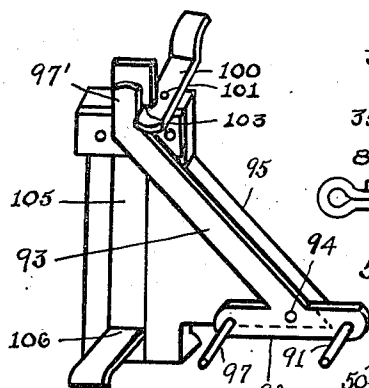


Fig. 5

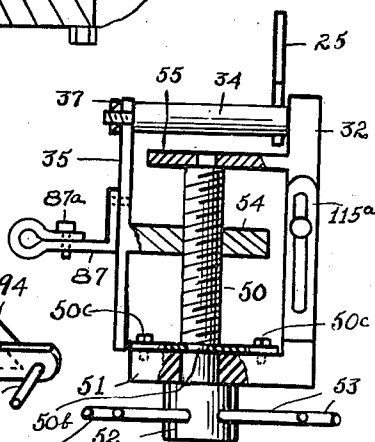


Fig. 6

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## UNITED STATES PATENT OFFICE

2,029,227

GARMENT TAPERING ATTACHMENT FOR  
KNITTING MACHINES

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14 Claims. (Cl. 66—9)

My invention relates to a garment tapering attachment for knitting machines and I declare the following to be a full, clear, concise and exact description thereof sufficient to enable anyone skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings in which like reference characters refer to like parts throughout the specification.

The object of the invention is to provide a device to be attached to a knitting machine, whereby to effect a gradual decrease or increase in the circumference of tubular knitted fabric. This attachment is used particularly on those knitting machines which supply a rubberized yarn or rubber thread in between the needles to effect a stretchable fabric.

In the present device the attachment is provided with means, whereby to gradually decrease the feeding of the rubberized yarn or rubber thread, whereby to contract the diameter of tubular fabric progressively towards a predetermined limit or it can increase the feeding of the rubberized yarn or rubber thread gradually to enlarge the tubular fabric.

Furthermore the attachment is provided with means for speeding up the decrease or increase in feeding of the rubber yarn, whereby to effect a more or less abrupt taper in the tubular fabric.

There is also an automatic stop means for stopping the knitting machine when the rate at which the thread is fed varies outside a predetermined range of the rate of feed.

Other objects will be understood by referring to the drawings in which:

Fig. 1 is a perspective view of the attachment showing it in connection with the related parts of a knitting machine.

Fig. 2 is a plan view of a portion of a tubular fabric showing the diverging and converging portions thereof effected by the attachment to the knitting machine.

Fig. 3 is a side elevation looking in the opposite direction to that of Fig. 1 showing parts in section of the attachment and its connection with the knitting machine, which is broken away.

Fig. 4 is a detailed view showing end elevation of the vertical movable plate employed and immediate parts.

Fig. 5 is a detailed enlarged view showing a perspective of a bracket a trip member fulcrumed thereto and other related parts.

Fig. 6 is a detailed enlarged view showing parts in full and parts in section of the movable plate and immediate parts illustrated in Fig. 4.

Fig. 7 is a detailed enlarged view showing a perspective of certain plates employed.

Referring more particularly to the drawings, the attachment is connected to a circular dial knitting machine in which is the cylinder 1 holding the vertical knitting machine needles 2 and dial 3 holding the horizontal knitting machine needles 4. Cylinder 1 and dial 3 are stationary and the yarn feeders are caused to move around said needles 2 and 4 in the direction of the arrow on Fig. 1.

The attachment feeds a rubberized yarn 5 in between said needles 2 and 4. It embodies a roller 10 over which the rubberized yarn 5 travels and by which it is fed more or less freely in accordance with its position on said roller 10.

Roller 10 is held in position by a bracket 11 which has an upstanding bearing part 12 at one end and another 13 at the other. Roller 10 has trunnion or bearing member 14 at one end and is engaged by the tapering part 15 of a pintle 16 at the other. Pintle 16 is mounted in a suitable bearing in part 13 of bracket 11.

Bracket 11 supports beneath roller 10 a square shaped bar 20 which is attached, so as to leave space therebeneath at 21. A sliding block 22 having an open recess 23 to fit bar 20 is mounted on bar 20.

The means for moving block 22 back and forth on bar 20 embodies a lever 25, which is connected to block 22 by means of a link 26 pivoted at 27 to block 22 and at 28 to lever 25. Lever 25 is fulcrumed at 31 to auxiliary bracket 32 and is slotted at 33 for the projection of laterally projecting adjustable pivot 34. Pivot 34 is mounted in vertically movable plate 35 by having a reduced screw threaded end thereof projected through an elongated aperture 36 in the plate 35 and held in given position by a nut 37. The elongated aperture 36 allows for the horizontal adjustment of said pivot 34, whereby to vary the amount of swing of lever 25. Auxiliary bracket 32 is attached in a permanent manner to the contiguous surface of bracket 11.

Block 22 supports upon its upper surface a narrow plate 38. Plate 38 has mounted thereon a member 39 from which projects a rubberized yarn guide rod 40 at one end and at the other a yarn guide member 41 having an open slot 42 for the passage of rubberized yarns partially surrounding roller 10. Another yarn guide 43 is carried on plate 38 from which the yarn 5 is carried down to guide 44 attached to rod 45 that projects through swiveled lug 46. Lug 46 is held in clamp

47 formed integral with sleeve 48. A screw 49 is mounted in clamp 47 to hold it together.

The means for holding plate 35 in position and causing it to move vertically embodies a screw 50 mounted in the lower horizontal shelf 51 of auxiliary bracket 32 and held in place by plates 50a, 50a engaging an annular groove 50b in screw 50. Plates 50a are bolted at 50c to shelf 51. The lower end of screw 50 projects down through a loose aperture in shelf 51. Its lower end is enlarged at 52. Spokes 53 are mounted in part 52 and radiate therefrom for a purpose to be hereinafter described.

Screw 50 projects upward through a screw threaded aperture in horizontal shelf 54 formed integral with plate 35. The upper end of screw 50 is reduced and has a bearing in horizontal shelf 55 formed integral with auxiliary bracket 32, whereby the turning of screw 50 will cause shelf 54 and plate 35 integral therewith to travel on said screw 50 upwards or downwards in accordance with the direction in which screw 50 is turned, whereas said screw 50 will turn but not move longitudinally.

Auxiliary bracket 32 is fastened to revolving base 56 of the knitting machine by bracket 57 that is made integral with auxiliary sleeve 48 and bracket 11 and is bolted at 58 to said base 56.

The means for turning screw 50 to move plate 35 upwards or downwards, whereby to control the throw of lever 25 contemplates levers 60 and 61. Levers 60 and 61 are fulcrumed on a shaft 62 carried in bearings in arms 63, 63 that are bolted or otherwise fastened to the under stationary surface of the knitting machine. The free ends of levers 60 and 61 have formed integral therewith upstanding lugs 64 and 65 respectively which are adapted to engage and hold stationary spokes 53 for short intervals as the attachment moves past the stationary levers 60 and 61. Lugs 64, 65 engage spokes 53 upon opposite sides of enlarged part 52 of screw 50 when severally rocked upward into engaging position as revolving base 56 of the knitting machine turns around.

When lug 64 of lever 60 is rocked upward into engaging position with spokes 53 screw 50 will be turned to move plate 35 upward and thereby through pivot 34 rock lever 25 upward to slide block 22 upward or towards the right on bar 20 in Fig. 1. This in turn will move rubberized yarn 5 upward on roller 10 or into that position where a larger diameter of the surface of revolving conical cooperating feeding member 67 will cooperate with roller 10 to feed more rubberized yarn 5 to the knitting machine to increase the diameter of tubular fabric 68. Inasmuch as block 22 moves slowly the increase or taper in the garment 68 will be gradual as shown in Fig. 2. The degree or pitch of said taper, however, can be regulated by adjusting pivot 34 to the right or left in slot 30 of plate 35.

When lug 65 of lever 61 is rocked upwards the turning of screw 50 will be in the opposite direction to lower plate 35 and thereby through the connecting members above described, lower block 22 or move it to the left in Fig. 1 to carry rubberized yarn 5 to a smaller diameter of the surface of revolving conical cooperating feeding member 67, whereby to decrease the diameter of the tubular fabric 68. Likewise the degree of pitch of the taper can be regulated by moving adjustable pivot 34 to the right or left as above described.

The means for rocking levers 60 and 61 at predetermined intervals embodies rock members 70

and 71 respectively. Rock members 70 and 71 are fulcrumed upon shaft 72 having bearings on stationary arms 63, 63 attached to the stationary part of the knitting machine as above described. Rock members 70 and 71 are connected to rock levers 60 and 61 respectively by yielding adjustable connecting links 73, 73.

Each of the rock members 70 and 71 has a depending lug or cam 74 adapted to make contact at predetermined intervals with pattern chains 75, 76 respectively. Pattern chains 75, 76 run upon sprockets 77, 77 and carry elevations 78 at given positions to actuate said rock members 70 and 71 at the proper intervals.

Conical member 67 which cooperates with cylinder 10 in feeding rubberized yarn 5 is mounted to revolve with shaft 80 that is carried in sleeve 48 attached by arm 81 to bracket 11. Arm 81 is formed integral with bracket 11. A toothed or notched wheel 82 is fastened to the lower end of shaft 80. It is caused to revolve by the engagement of its peripheral teeth 83 with corresponding teeth 84 formed on the lateral wall of cylinder 10 which is stationary as above mentioned.

The means for automatically arresting or stopping the turning of the screw 50 beyond a given or predetermined limit to prevent the breaking of contiguous parts, embodies an arm 86 supported in a horizontal position by bracket 87 attached by screws or otherwise to the lateral surface of vertically movable plate 35. Arm 86 is clamped to bracket 87 by screw 87a or otherwise fastened. It is bent at right angles at 88. Its free end supports hooks 89 and 90.

Hook 89 is adapted to engage laterally horizontally extending stud 91 projecting from the lower end 92 of trip member 93. Trip member 93 is fulcrumed at 94 to bracket 95 fastened to revolving base 56 of the knitting machine. When hook 89 engages stud 91 it will rock trip member 93 on its fulcrum 94 to cause the upper part 97 to rotate latch 100 hereinafter described, whereas hook 90 is adapted to engage stud 97 projecting from the opposite part of lower end 92 of trip member 93 to rotate latch 100.

Rotatable latch 100 is pivoted at 101 to upstanding bracket 95. It engages a slot 103 formed in vertically sliding stop member 105, mounted to slide in bracket 95. The lower end of stop member 105 is formed at right angles at 106. Its free end 107 is curved downward and lies just above shifting ring 110. Shifting ring 110 is provided with upstanding elevations 111.

When trip member 93 is rocked on its fulcrum 94 by the engagement of either of the hooks 89 or 90 with studs 91 or 97 respectively projecting laterally therefrom, it will rock latch member 100 from slot 103 in stop member 105, which will thereupon fall downward under force of its own weight or gravity and cause its end 107 to engage with one of the elevations 111 of shifting ring 110. Ring 110 will thereupon be shifted to stop the knitting machine by well known mechanism.

The operation of the attachment is effected by throwing into gear the pattern chains 75, 76 at the proper intervals. If it is desirable to gradually increase the diameter of tubular fabric 68, as shown between lines 115 and 116, Fig. 2, pattern chain 75 will be actuated to rock member 70 and lever 60 connected thereto, whereby to bring lug 64 up into the path and on the outer side of spokes 53.

When the attachment moves therepast, lug 64 will engage one of the spokes 53 and thereby turn screw 50 a partial turn to the left to move 75

shelf 54 and plate 35 integral therewith upward. This in turn will elevate pivot 34 and rock lever 25 through a small arc to slightly elevate or move block 22 to the right on bar 20. The movement of block 22 will carry guide member 41 and yarn 5 upwards on roller 10 towards a larger circumference of cooperating conical feeding member 67, whereby to effect an increase of feeding of rubberized yarn 5. When the tubular fabric 68 has been increased to a predetermined diameter, the elevations 78 on pattern chain 75 which are arranged to conform with this predetermined diameter of tubular fabric 68 from line 115 to line 116 as indicated in Fig. 2 will have passed by depending lug or cam 74 on rock member 70 and thereby allow rock member 70 to turn counterclockwise on its fulcrum 72 under weight of its end 79, whereby its opposite end will through its connection by means of adjustable yielding link 73 rock cooperating lever 60 to lower lug 64 thereon out of the path of spokes 53 of screw 50. The knitting machine will thereupon knit a length of uniform diameter as shown between lines 116 and 117, Fig. 2.

In the event lug 64 has not been lowered out of the path of spokes 53 when the screw 50 has reached near its upper limit, the automatic stop mechanisms heretofore described will cause hook 90 which has been carried upward with arm 86 simultaneously with plate 35 to make contact with stud 97, whereby to rock trip member 92. The rocking of member 92 will cause its upper end to turn latch 100 on its fulcrum 101 and thereby push said latch 100 free from slot 103 in sliding stop member 105. Stop member 105 will thereupon fall downward under force of gravity, whereby its free end 107 will lie in the path of one of the elevations 111 of shifting stop ring 110, whereby to stop the knitting machine.

In the event, however, that it is desirable to reverse the taper on the tubular knitted fabric 68 or to gradually decrease the diameter thereof as shown between lines 117 and 118, Fig. 2, pattern chain 76 will be actuated to operate member 71 and rock lever 61 to thereby bring lug 65 thereon into the path of spokes 53. When the attachment passes lug 65 one of the spokes 53 will engage with lug 65 and thereby cause screw 50 to turn to the right, in Fig. 1, whereupon plate 35 will travel downwards with a corresponding movement of lever 25 and the lowering or moving to the left of block 22 and yarn guide 42, whereby to move the rubberized yarn 5 towards a smaller diameter of conical member 67 to lessen the feed of said yarn 5, which will decrease the diameter of tubular fabric 68.

When screw 41 has reached nearly its lower limit, the stop mechanism will automatically act to stop the knitting machine, in the event that any unforeseen difficulties arise to prevent the normal operation of the yarn feeding mechanism hereinabove described, otherwise the knitting machine will knit the normal stitch.

It will be observed that the conical feeding member 67 is rotated, whereby to feed the yarn 5 over roller 10 by the engagement of teeth 83 of wheel 82 with the teeth 84 on the wall of cylinder 1 as above explained.

Furthermore, the amount of taper shown in Fig. 2 can be made more or less gradual by adjusting pivot 34 in slot 36 of plate 35, whereby to control the amount of swing of lever 25.

The extent of taper can be regulated by adjusting plate 35 prior to actuating the pattern chains 75, 76 by means of an indicator 115a which is

attached to the end surface of auxiliary bracket 32. The lower edge of shelf 55 will be set with the lower edge of the indicator 115a to predetermine the extent of the taper.

Member 39 is made adjustable on plate 38 by a bolt and slot arrangement.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is as follows:

1. In a garment tapering attachment for a knitting machine, a roller for feeding yarn to a knitting machine, a conical member cooperating with said roller to aid in feeding said yarn, means for moving said yarn relative to said roller, whereby to control the rate of feed of said yarn and means connected with said attachment to automatically stop the knitting at predetermined rates of feed of said yarns.

2. In a garment tapering attachment for a knitting machine, a cylindrical roller, a conical member cooperating with said roller, a member for moving a thread relative to said roller and conical member, whereby to regulate the rate of feed of said thread to the knitting machine, a lever having a fixed fulcrum for operating said member, a reciprocating member for operating said lever, means adjustably connecting said reciprocating member and lever for varying the operation of said lever by said reciprocating member, a screw member for operating said reciprocating member and means for moving said screw member at predetermined intervals, whereby to gradually increase or decrease the feeding of said yarn to knitting machine.

3. In a knitting machine, rotating means for feeding a thread to said machine at rates throughout a predetermined range, means for shifting the thread with respect to said rotating means to vary the rate of feeding the thread and machine stopping means operated by said thread shifting means upon movement of said thread shifting means to feed the thread at a rate outside the predetermined range.

4. In a knitting machine, thread feeding means, means for shifting the thread with respect to said thread feeding means to vary the rate of feeding the thread throughout a predetermined range and machine stopping means operated by said thread shifting means upon shifting of said thread to feed the thread at a rate outside the predetermined range.

5. In a knitting machine, rotating means for feeding a thread to said machine, a guide feeding the thread to said rotating means, a lever for shifting said guide with respect to said rotating means, means for operating said lever and machine stopping means operated by said lever operating means.

6. In a knitting machine, means for feeding a thread to said machine, means to vary the rate of feed of the thread throughout a predetermined range and machine stopping means operated by said feed varying means upon operation of said feed varying means to vary the rate of feed of the thread to a rate outside the predetermined range.

7. In a knitting machine, means for feeding a thread to said machine, means to vary the rate of feed of the thread throughout a predetermined range, machine stopping means operated by said feed varying means upon operation of said feed varying means to vary the rate of feed of the thread to a rate outside the predetermined range and means to vary the range of the rate of feed for the thread.

8. In a knitting machine, means for feeding a thread to said machine, means to vary the rate of feed of the thread, abutments movably mounted on said machine, a stop member for engaging said abutments carried by a moving part of the machine, means holding said stop member from engaging with said abutments and means operated by said feed varying means for releasing said stop member to engage an abutment.
9. In a knitting machine, means for feeding a thread to said machine, means for automatically adjusting said thread feeding means for feeding the thread at varying rates within a predetermined range and means automatically stopping said machine upon adjustment of said thread feeding means to feed the thread at a rate outside the predetermined range.
10. In a knitting machine, thread feeding means for positively feeding a thread for the machine at varying rates within a predetermined range, means for varying the range of the rate for feeding the thread and automatically operating machine stopping means operative to stop the machine upon a variation of the rate of feed of the thread by said thread feeding means to a rate outside the predetermined range.
11. In a knitting machine, thread feeding means for positively feeding a thread, means for shifting the thread with respect to said thread feeding means for periodically varying the rate of feed of the thread throughout a predetermined range and means for stopping the machine operated by said thread shifting means upon operation of said shifting means to shift the thread to feed at a rate outside the predetermined range.

12. In a knitting machine, thread feeding means for positively feeding a thread, means for shifting the thread with respect to said thread feeding means for periodically varying the rate of feed of the thread throughout a predetermined range, means for varying the range of the rate of feed of the thread, and machine stopping means operated by said thread shifting means upon operation of said thread shifting means to shift the thread to feed at a rate outside the predetermined range.

13. In a knitting machine, means for feeding a thread to said machine, means for adjusting said thread feeding means for feeding the thread at rates within a predetermined range and means for stopping said machine by movement of said thread feeding means to feed the thread at a rate outside the predetermined range.

14. In a knitting machine, thread feeding means for positively feeding a thread for the machine at rates within a predetermined range, means for varying the predetermined range of the rate for feeding the thread and machine stopping means operated to stop the machine by movement of the thread feeding means to vary the rate of feed of the thread to a rate outside the predetermined range.

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